

Building Evaluation

**Norton Fire Department
69 Bay Road
Norton, Massachusetts**



Prepared by:
Massachusetts Department of Public Health
Center for Environmental Health
Emergency Response/Indoor Air Quality Program
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Background/Introduction

At the request of Richard Gomes, Chief, Norton Fire Department (NFD), the Massachusetts Department of Public Health's (MDPH) Center for Environmental Health (CEH) provided assistance and consultation regarding indoor air quality at the NFD, 69 Bay Road (Bay Road station), Norton, Massachusetts. On September 1, 2005, Cory Holmes, an Environmental Analyst in CEH's Emergency Response/Indoor Air Quality (ER/IAQ) Program, conducted an indoor air quality assessment at the Bay Road Station. At the time of the assessment, the NFD and Town Officials were considering re-occupying the building, which has been vacant for approximately 10 years. The request was prompted by concerns about mold growth and chronic problems with water penetration in the building.

The Bay Road station is an uninsulated one-story cinderblock building on cement slab that was constructed in the early to mid-1950s. The station consists of an engine bay with two garage doors, an office, a dispatch area, kitchen and a restroom. Building components are original (e.g., ceilings, windows, electrical, plumbing), with the exception of the kitchen. The kitchen, made of wood and gypsum wallboard (GW) located at the rear of the engine bay was constructed at a later date. It is important to note, however, that the kitchen is severely water damaged, thus rendering it currently unusable (Pictures 1 to 3).

Discussion

Microbial/Moisture Concerns

Extensive water damage and microbial growth was observed on porous building materials (e.g., carpeting, ceiling tiles, GW) throughout the station (Pictures 3 to 7). At the

time of the assessment, evidence of active roof leaks in the form of standing water, was observed in a number of areas (Pictures 8 and 9).

MDPH staff examined the outside perimeter of the building to identify breaches in the building envelope that could provide a source of water penetration. A number of exterior sources for moisture infiltration were identified:

- Damaged/dislodged gutters and downspouts (Pictures 10 and 11).
- Cracks in the tarmac caused by plant growth between the foundation and tarmac (Pictures 12 and 13). The growth of roots along exterior walls can hold moisture and eventually lead to cracks and/or fissures.
- Rotted wooden windowsills, damaged window frames and broken/missing windowpanes (Picture 14 through 8).
- Crumbling or missing mortar around exterior brickwork (Picture 19 through 21).
- Cracked, broken or damaged cinderblocks (Pictures 21 through 23).
- Garage bay doors were off-track and did not close properly, which can also provide an entry for pests and rodents (Picture 24).

These conditions can undermine the integrity of the building envelope and provide a means of water entry by capillary action into the building through exterior walls, foundation concrete and masonry (Lstiburek & Brennan, 2001).

Finally, no local mechanical local exhaust ventilation exists in the engine bays to remove vehicle exhaust emissions. Under normal conditions, a firehouse can have several sources of environmental pollutants present from the operation of fire vehicles. In general, common combustion emissions can include carbon monoxide, carbon dioxide, water vapor and smoke. Of these materials, carbon monoxide can produce immediate, acute health effects

upon exposure. Without local exhaust ventilation these pollutants can build up and lead to indoor air quality complaints/health effects.

Conclusions/Recommendations

The conditions noted at the Bay Road fire station raise a number of indoor air quality concerns. The combination of the general building conditions, building envelope integrity, structural soundness and the lack of a local exhaust system to remove engine bay pollutants, if considered individually, present conditions that could degrade indoor air quality. When combined, these conditions can serve to further negatively affect indoor air quality.

Remediation of these issues will require alteration to the building structure and equipment and, in some cases, wholesale replacement of building components. In view of the findings at the time of the visit, the following recommendations are made:

1. Remove and replace any mold contaminated/water damaged GW building materials (GW, carpet, ceiling tiles, etc.). This measure will remove actively growing mold colonies that may be present. Remove mold contaminated materials in a manner consistent with recommendations found in “Mold Remediation in Schools and Commercial Buildings” published by the US Environmental Protection Agency (US EPA, 2001). The document is available at the US EPA website:
http://www.epa.gov/iaq/molds/mold_remediation.html. Removing water-damaged GW and wooden trim will also provide maintenance personnel with the opportunity to observe conditions within the wall cavity and determine whether any signs of water penetration through breaches of the building envelope exist.
2. Repair/replace damaged windows and window frames to prevent water penetration. Due to the age of the building, certain window materials (i.e., caulking) may contain

asbestos. Contact the Massachusetts Department of Labor and Workforce Development, Division of Occupational Safety (DOS), Asbestos Program and/or a licensed asbestos abatement contractor to identify and remediate potential asbestos containing materials in conformance with all applicable Massachusetts asbestos abatement and hazardous materials disposal laws.

3. Consult with a structural engineer to evaluate the structural integrity of the building.
4. Replace roof and have structural engineer determine if the buildings support system can hold the weight of a new roof.
5. Repair/replace damaged/missing gutters and downspouts to direct rainwater away from the building.
6. Repair breaches in the building envelope including, cracks in walls and tarmac, missing/damaged flashing.
7. Repair/replace damaged garage bay doors.
8. Install local exhaust system in engine bay to remove vehicle exhaust emissions.
9. For further building-wide evaluations and advice on maintaining public buildings, see the resource manual and other related indoor air quality documents located on the MDPH's website at http://mass.gov/dph/indoor_air.

References

Lstiburek, J. & Brennan, T. 2001. Read This Before You Design, Build or Renovate. Building Science Corporation, Westford, MA. U.S. Department of Housing and Urban Development, Region I, Boston, MA

US EPA. 2001. Office of Air and Radiation, Indoor Environments Division, Washington, DC. EPA 402-K-01-001. March 2001. Available at:
http://www.epa.gov/iaq/molds/mold_remediation.html

Picture 1



Kitchen built of Wood and Gypsum Wallboard in Engine Bay

Picture 2



Frame for Ceiling Tile System of Kitchen in Engine Bay

Picture 3



Water Damaged/Mold Colonized Materials in Kitchen in Engine Bay, Note Ceiling Tiles on Floor that Caved in Due to Water Penetration

Picture 4



Mold Growth (Dark Staining) on Ceiling of Engine Bay

Picture 5



Water Damaged/Mold Colonized Ceiling Tiles in Dispatch Area

Picture 6



Water Damaged/Mold Colonized Ceiling Tiles in Office

Picture 7



Mold Growth (Dark Staining) on GW in Engine Bay

Picture 8



Active Roof Leak and Standing Water on Engine Bay Floor

Picture 9



Active Roof Leak and Standing Water on Engine Bay Floor

Picture 10



Missing Downspout to Gutter System

Picture 11



Damaged Gutter System

Picture 12



Tree/Plant Growth against the Building

Picture 13



Tree/Plant Growth against the Building

Picture 14



Broken Window on Garage Door

Picture 15



Boarded Up Window

Picture 16



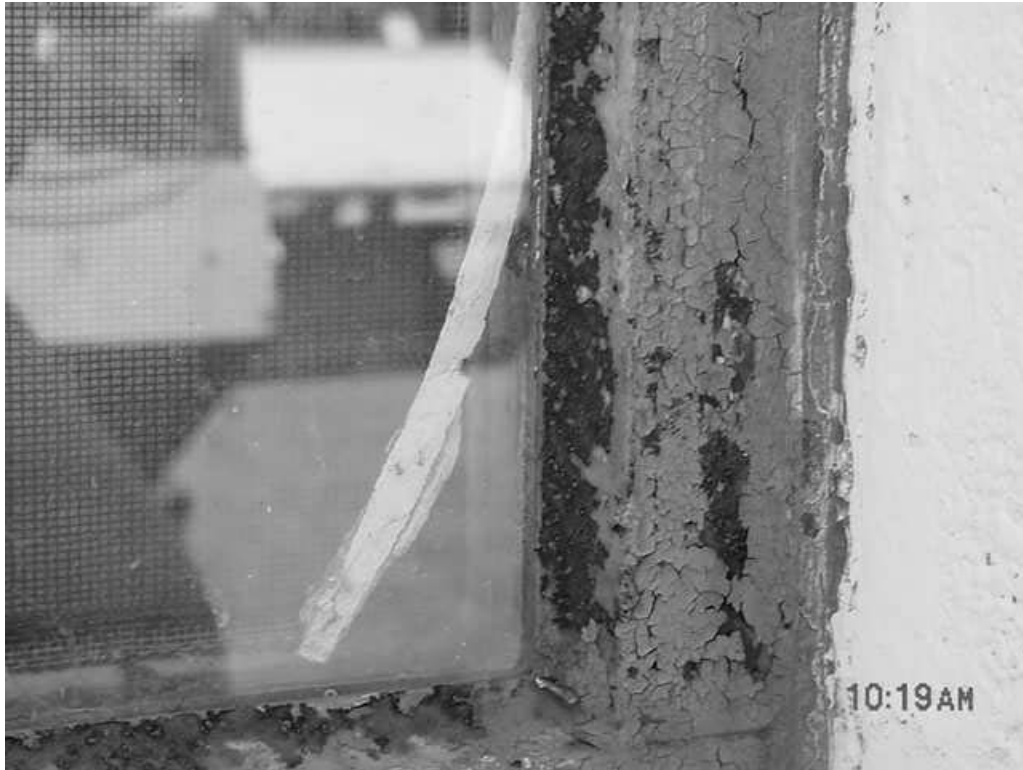
Broken/Boarded Up Windows

Picture17



Missing Damaged Caulking around Window Panes

Picture 18



Missing Damaged Caulking around Window Panes

Picture 19



Missing/Damaged Mortar around Cinder Block

Picture 20



Missing/Damaged Mortar between Cement Slab and Cinderblock, Pen Inserted to Show Depth

Picture 21



Missing/Damaged Mortar around Cinder Block, also Note Cracked/Broken Cinderblocks

Picture 22



Cracked/Broken Cinderblocks near Roof

Picture 23



Cracked/Broken Cinderblocks near Roof

Picture 24



Broken Bottom of Garage Bay Doors